
Curriculum Vitae

James F. Cahoon, Ph.D.

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Address

James F. Cahoon, Ph.D.
Department of Chemistry, CB #3290
University of North Carolina at Chapel Hill
Caudill 019, 131 South Road
Chapel Hill, NC 27599-3290

Education

2009–2011, Post-Doctoral
Intelligence Community Postdoctoral Research Fellow
Department of Chemistry & Chemical Biology, Harvard University
Research advisor: Prof. Charles M. Lieber

2003–2008, Ph.D. Department of Chemistry, University of California, Berkeley (12/20/2008)
Research advisor: Prof. Charles B. Harris

1999–2003, B.S. Summa Cum Laude & Highest Honors, The College of William and Mary
Concentrations in Chemistry & Philosophy
Research advisor: Prof. Robert A. Orwoll

Professional Experience

2018–Present Executive Director, Chapel Hill Analytical and Nanofabrication Laboratory
(CHANL: chanl.unc.edu)

2017–Present Associate Professor, Department of Chemistry, UNC Chapel Hill

2015–Present UNC Director for the Research Triangle Nanotechnology Network (RTNN), a
site in the National Nanotechnology Coordinated Infrastructure (www.rtnn.org)

2011–2017 Assistant Professor, Department of Chemistry, UNC Chapel Hill

Honors and Awards

2017 Phillip and Ruth Hettleman Prize for Artistic and Scholarly Achievement

2016 National Science Foundation CAREER Award

2015 Sloan Research Fellowship

2015 Cottrell Scholar Award

2014 Packard Fellowship for Science and Engineering

2010 ACS Physical Chemistry Division Post-doctoral Research Award

2009 Intelligence Community Post-doctoral Fellowship

2004 National Science Foundation Graduate Research Fellowship

2003 William George Guy Prize in Chemistry, William and Mary

2003 Thomas Jefferson Prize in Natural Philosophy, William and Mary

2002 Phi Beta Kappa, William and Mary

2002 Barry M. Goldwater Scholarship

2001 Virginia Space Grant Consortium Undergraduate Research Scholarship

Refereed Articles from UNC-Chapel Hill (*denotes corresponding author publications)

- 50)* "Interplay of Surface Recombination and Diode Geometry for the Performance of Axial p-i-n Nanowire Solar Cells," D. J. Hill, T. S. Teitsworth, E. T. Ritchie, J. M. Atkin, **J. F. Cahoon**. ACS Nano, ASAP Article, DOI: 10.1021/acsnano.8b06577.
- 49)* "Mie-Coupled Bound Guided States in Nanowire Geometric Superlattices," S. Kim, K.-H. Kim, D. J. Hill, H.-G. Park, **J. F. Cahoon**. Nature Commun. *9*, 2781 (2018).
- 48) "Enhancement of Light Absorption in Silicon Nanowire Photovoltaic Devices with Dielectric and Metallic Grating Structures," J.-S. Park, K.-H. Kim, M.-S. Hwang, X. Zhang, J. M. Lee, J. Kim, K.-D. Song, Y.-S. No, K.-Y. Jeong, **J. F. Cahoon**, S.-K. Kim, H.-G. Park. Nano Lett. *17*, 7731–7736 (2017).
- 47)* "Self-Catalyzed Vapor-Liquid-Solid Growth of Lead Halide Nanowires and Conversion to Hybrid Perovskites," J. K. Meyers, S. Kim, D. J. Hill, E. E. M. Cating, L. J. Williams, A. S. Kumbhar, J. R. McBride, J. M. Papanikolas, **J. F. Cahoon**. Nano Lett. *17*, 7561–7568 (2017).
- 46)* "Mapping Free-Carriers in Multijunction Silicon Nanowires Using Infrared Near-Field Optical Microscopy," E. T. Ritchie, D. J. Hill, T. M. Mastin, P. C. Deguzman, **J. F. Cahoon**, J. M. Atkin. Nano Lett. *17*, 6591–6597 (2017).
- 45)* "Optoelectronics: Letting Photons out of the Gate," **J. F. Cahoon**. Nature Nanotechnology | News and Views, *12*, 938-939 (2017).
- 44)* "Encoding Highly Non-Equilibrium Boron Concentrations and Abrupt Morphology in P-Type/N-Type Silicon Nanowire Superlattices," D. J. Hill, T. S. Teitsworth, S. Kim, J. D. Christesen, **J. F. Cahoon**. ACS Appl. Mater. Interfaces, *9*, 37105-37111, (2017).
- 43) "Interfacial Electron Transfer Yields in Dye-Sensitized NiO Photocathodes Correlated to Excited-State Dipole Orientation of Ruthenium Chromophores" Y. Han, R. Dillon, C. J. Flynn, E. S. Rountree, L. Alibabaei, **J. F. Cahoon**, J. M. Papanikolas, J. L. Dempsey. Can. J. Chem. e-First Article, DOI: 10.1139/cjc-2017-0359.
- 42)* "Probing Intrawire, Interwire, and Diameter-Dependent Variations in Silicon Nanowire Surface Trap Density with Pump-Probe Microscopy," E. E. M. Cating, C. W. Pinion, J. D. Christesen, C. A. Christie, E. M. Grumstrup, **J. F. Cahoon**, J. M. Papanikolas. Nano Lett., *17*, 5956-5961 (2017).
- 41)* "Material Informatics Driven Design and Experimental Validation of Lead Titanate as an Aqueous Solar Photocathode," T. Moot, O. Isayev, R. W. Call, S. M. McCullough, M. Zemaitis, R. Lopez, **J. F. Cahoon**, A. Tropsha. Mater. Discov. *6*, 9–16 (2016).
- 40)* "Designing Morphology in Epitaxial Silicon Nanowires: The Role of Gold, Surface Chemistry, and Phosphorus Doping," S. Kim, D. J. Hill, C. W. Pinion, J. D. Christesen, J. R. McBride, **J. F. Cahoon**. ACS Nano. *11*, 4453–4462 (2017).
- 39) "All-in-one Derivatized Tandem p⁺n-Silicon-SnO₂/TiO₂ Water Splitting Photoelectrochemical Cell," M. V. Sheridan, D. J. Hill, B. D. Sherman, D. Wang, S. L. Marquard, K.-R. Wee, **J. F. Cahoon**, T. J. Meyer. Nano Lett. *17*, 2440–2446 (2017).
- 38)* "Barrierless Switching between a Liquid and Superheated Solid Catalyst During Nanowire Growth," C. W. Pinion, D. J. Hill, J. D. Christesen, J. R. McBride, **J. F. Cahoon**. J. Phys. Chem. Lett. *7*, 4236–4242 (2016).
- 37)* "Capillarity-Driven Welding of Semiconductor Nanowires for Crystalline and Electrically Ohmic Junctions," T. A. Celano, D. J. Hill, X. Zhang, C. W. Pinion, J. D. Christesen, C. J. Flynn, J. R. McBride, **J. F. Cahoon**. Nano Lett. *16*, 5241–5246 (2016)
- 36)* "Passivation of Nickel Vacancy Defects in Nickel Oxide Solar Cells by Targeted Atomic Deposition of Boron," C. J. Flynn, S. M. McCullough, L. Li, C. L. Donley, Y. Kanai, **J. F. Cahoon**. J. Phys. Chem. C. *120*, 16568–16576 (2016).
- 35)* "Site-Selective Passivation of Defects in NiO Solar Photocathodes by Targeted Atomic

- Deposition," C. J. Flynn, S. M. McCullough, E. Oh, L. Li, C. C. Mercado, B. H. Farnum, W. Li, C. L. Donley, W. You, A. J. Nozik, J. R. McBride, T. J. Meyer, Y. Kanai, **J. F. Cahoon**. ACS Appl. Mater. Interfaces. *8*, 4754–4761 (2016).
- 34)* "Chemically Engraving Semiconductor Nanowires: Using Three-Dimensional Nanoscale Morphology to Encode Functionality from the Bottom Up," J. D. Christesen, C. W. Pinion, D. J. Hill, S. Kim, **J. F. Cahoon**. J. Phys. Chem. Lett. (Invited Perspective), *7*, 685–692 (2016).
****Discussed in the editorial “Nanoparticles at SEA: Seeding, Etching, and Applications” by Greg Hartland in the same issue.**
- 33)* "Understanding the Vapor-Liquid-Solid Mechanism of Si Nanowire Growth and Doping to Synthetically Encode Precise Nanoscale Morphology," C. W. Pinion, J. D. Christesen, **J. F. Cahoon**. J. Mater. Chem. C, (Highlight Article for the Emerging Investigator Issue), *4*, 3890-3897 (2016).
****Inside cover of the special issue “Emerging Investigators 2016: Novel design strategies for new functional materials”**
- 32) "Designing Plasmon-Enhanced Thermochromic Films Using a Vanadium Dioxide Nanoparticle Elastomeric Composite," T. Moot, C. Palin, S. Mitran, **J. F. Cahoon**, and R. Lopez. Adv. Opt. Mater., *4*, 578–583 (2016).
- 31)* "Imaging Spatial Variations in the Dissipation and Transport of Thermal Energy within Individual Silicon Nanowires Using Ultrafast Microscopy," E. E. M. Cating, C. W. Pinion, E. M. van Goethem, M. M. Gabriel, **J. F. Cahoon**, and J. M. Papanikolas. Nano Lett., *16*, 434–439 (2016).
- 30)* "Compositionally-Tunable Mechanochemical Synthesis of $Zn_xCo_{3-x}O_4$ Nanoparticles for Mesoporous p-Type Photocathodes," S. M. McCullough, C. J. Flynn, C. C. Mercado, A. J. Nozik, **J. F. Cahoon**. J. Mater. Chem. A, *3*, 21990-21994 (2015).
- 29)* "Doubling Absorption in Nanowire Solar Cells with Dielectric Shell Optical Antennas," S.-K. Kim, X. Zhang, D. J. Hill, J.-S. Park, K.-D. Song, H.-G. Park, **J. F. Cahoon**. Nano Lett. *15*, 753-758 (2015).
- 28)* "Encoding Abrupt and Uniform Dopant Profiles in Vapor-Liquid-Solid Nanowires by Suppressing the Reservoir Effect of the Liquid Catalyst," J. D. Christesen, C. W. Pinion, X. Zhang, J. R. McBride, **J. F. Cahoon**. ACS Nano. *8*, 11790-11798 (2014).
- 27) "Sensitized Zinc Cobalt Oxide Spinel p-type Photoelectrodes," C. Mercado, A. Zakutayev, K. Zhu, C. J. Flynn, **J. F. Cahoon**, A. J. Nozik. J. Phys. Chem. C. *118*, 25340–25349 (2014).
- 26)* "Reversible Strain-Induced Electron-Hole Recombination in Silicon Nanowires Observed with Femtosecond Pump-Probe Microscopy," E. M. Grumstrup, M. M. Gabriel, C. W. Pinion, J. K. Parker, **J. F. Cahoon**, J. M. Papanikolas. Nano Lett. *14*, 6287-6292 (2014).
- 25)* "Waveguide Scattering Microscopy for Dark-Field Imaging and Spectroscopy of Photonic Nanostructures," D. J. Hill, C. W. Pinion, J. D. Christesen, **J. F. Cahoon**. ACS Photonics (cover article). *1*, 725–731 (2014).
****Cover of the August 2014 issue and featured as one of the “Most Read” articles**
- 24)* "Identifying Crystallization and Incorporation Limited Regimes During Vapor-Liquid-Solid Growth of Si Nanowires," C. W. Pinion, D. Nenon, J. D. Christesen, **J. F. Cahoon**. ACS Nano. *8*, 6081-6088 (2014).
- 23)* "Hierarchically-Structured NiO Nanoplatelets as Mesoscale p-Type Photocathodes for Dye-Sensitized Solar Cells," C. J. Flynn, E. E. Oh, S. M. McCullough, R. W. Call, C. L. Donley, R. Lopez, **J. F. Cahoon**. J. Phys. Chem. C. *118*, 14177-14184 (2014).
- 22)* "Imaging Charge Separation and Carrier Recombination in Nanowire p-i-n Junctions Using Ultrafast Microscopy," M. M. Gabriel, E. M. Grumstrup, J. R. Kirschbrown, C. W. Pinion, J. D. Christesen, D.F. Ziegler, E. M. Cating, **J. F. Cahoon**, J. M. Papanikolas. Nano Lett. *14*, 3079-3087

(2014).

****Featured as one of the “Most Read” articles**

- 21)* "Ultrafast Carrier Dynamics in Individual Silicon Nanowires: Characterization of Diameter-Dependent Carrier Lifetime and Surface Recombination with Pump-Probe Microscopy," E. M. Grumstrup, M. M. Gabriel, E. M. Cating, C. W. Pinion, J. D. Christesen, J. R. Kirschbrown, E. L. Vallorz III, **J. F. Cahoon**, J. M. Papanikolas. *J. Phys. Chem. C*, *118*, 8634-8640 (2014).
- 20)* "Ultrafast Carrier Dynamics of Silicon Nanowire Ensembles: The Impact of Geometrical Heterogeneity on Charge Carrier Lifetime," E. M. Grumstrup, E. M. Cating, M. M. Gabriel, C. W. Pinion, J. D. Christesen, J. R. Kirschbrown, E. L. Vallorz III, **J. F. Cahoon**, J. M. Papanikolas. *J. Phys. Chem. C*, *118*, 8626-8633 (2014).
- 19)* "Synthetically Encoding 10 nm Morphology in Silicon Nanowires," J. D. Christesen, C. W. Pinion, E. M. Grumstrup, J. M. Papanikolas, **J. F. Cahoon**. *Nano Lett.* *13*, 6281-6286 (2013).
****Featured in “Nanofabrication: Engraving Nanowires” by Fabio Pulizzi, Research Highlight in Nature Nanotechnology (January 2014)**
- 18)* "Horizontal Silicon Nanowires with Radial p-n Junctions: A Platform for Unconventional Solar Cells," X. Zhang, C. W. Pinion, J. D. Christesen, C. J. Flynn, T. A. Celano, **J. F. Cahoon**. *J. Phys. Chem. Lett.* (Invited Perspective), *4*, 2002-2009 (2013).
****Discussed in editorial by Greg Scholes in the same issue.**
- 17)* "Direct Imaging of Free Carrier and Trap Carrier Motion in Silicon Nanowires by Spatially-Separated Femtosecond Pump-Probe Microscopy," M. M. Gabriel, J. R. Kirschbrown, J. D. Christesen, C. W. Pinion, D. F. Zigler, E. M. Grumstrup, B. P. Mehl, E. E. M. Cating, **J. F. Cahoon**, J. M. Papanikolas. *Nano Lett.* *13*, 1336-1340 (2013).
****Featured in “Ultrafast Microscopy: Charge Carriers Caught on Camera” by Elisa De Ranieri, Research Highlight in Nature Nanotechnology (April 2013)**
- 16)* "Design Principles for Photovoltaic Devices Based on Si Nanowires with Axial or Radial p-n Junctions," J. D. Christesen, X. Zhang, C. W. Pinion, T. A. Celano, C. J. Flynn, **J. F. Cahoon**. *Nano Lett.* *12*, 6024-6029 (2012).

Refereed Articles Prior to UNC-Chapel Hill

- 15) "Direct Observation of Metal-Ketenes Formed by Photoexcitation of a Fischer-Carbene Using Ultrafast Infrared Spectroscopy," S. C. Nguyen, J. P. Lomont, M. C. Zoerb, P. V. Pham, **J. F. Cahoon**, C. B. Harris. *Organometallics*, *33*, 6149-6153 (2014).
- 14) "Tuning Light Absorption in Core/Shell Silicon Nanowire Photovoltaic Devices through Morphological Design," S.-K. Kim,[‡] R. W. Day,[‡] **J. F. Cahoon**,[‡] T. J. Kempa, K.-D. Song, H.-G. Park, C. M. Lieber ([‡]equal contribution). *Nano Lett.* *12*, 4971-4976 (2012).
****Highly Cited Paper by Thomson Reuters**
- 13) "Synthetically Encoded Ultrashort-Channel Nanowire Transistors for Fast, Pointlike Cellular Signal Detection," T. Cohen-Karni, D. Casanova, **J. F. Cahoon**, Q. Qing, D. C. Bell, C. M. Lieber. *Nano Lett.* *12*, 2639-2644 (2012).
- 12) "Coaxial Multishell Nanowires with High-Quality Electronic Interfaces and Tunable Optical Cavities for Ultrathin Photovoltaics," T. J. Kempa,[‡] **J. F. Cahoon**,[‡] S.-K. Kim, R. W. Day, D. C. Bell, H.-G. Park, C. M. Lieber ([‡]equal contribution). *Proc. Natl. Acad. Sci. U.S.A.*, *109*, 1407-1412 (2012).
****Highly Cited Paper by Thomson Reuters**
- 11) "Time-resolved IR Studies on the Mechanism for the Functionalization of Primary C-H Bonds by Photoactivated Cp*W(CO)₃(Bpin)," K. R. Sawyer, **J. F. Cahoon**, J. E. Shanoski, E. A. Glascoe, M. F. Kling, J. P. Schlegel, M. C. Zoerb, M. Hapke, J. F. Hartwig, C. E. Webster, C. B. Harris. *J. Am.*

Chem. Soc. *132*, 1848-1859 (2010).

- 10) "Direct Observation of Photoinduced Bent Nitrosyl Excited-State Complexes," K. R. Sawyer, R. P. Steele, E. A. Glascoe, **J. F. Cahoon**, J. P. Schlegel, M. Head-Gordon, C. B. Harris. J. Phys. Chem. A *112*, 8505-8514 (2008).
 - 9) "DFT and Time-Resolved IR Investigation of Electron Transfer between Photogenerated 17- and 19-Electron Organometallic Radicals," **J. F. Cahoon**, M. F. Kling, K. R. Sawyer, L. K. Andersen, C. B. Harris. J. Mol. Struct. (Memorial Issue for F. A. Cotton) *890*, 328-338 (2008).
 - 8) "Mechanism for Iron-Catalyzed Alkene Isomerization in Solution," K. R. Sawyer, E. A. Glascoe, **J. F. Cahoon**, J. P. Schlegel, C. B. Harris. Organometallics, *27*, 4370-4379 (2008).
 - 7) "Determining Transition-State Geometries in Liquids using 2D-IR," **J. F. Cahoon**, K. R. Sawyer, J. P. Schlegel, C. B. Harris. Science, *319*, 1820-1823 (2008).
- **Highlighted in RSC Chemistry World "Cutting Edge Chemistry in 2008"**
- 6) "19-Electron Intermediates in the Ligand Substitution of CpW(CO)₃ with a Lewis Base," **J. F. Cahoon**, M. F. Kling, K. R. Sawyer, H. Frei, C. B. Harris. J. Am. Chem. Soc. *128*, 3152-3153 (2006).
 - 5) "19-Electron Intermediates and Cage-Effects in the Photochemical Disproportionation of [CpW(CO)₃]₂ with Lewis Bases," **J. F. Cahoon**, M. F. Kling, S. Schmatz, C. B. Harris. J. Am. Chem. Soc. *127*, 12555-12565 (2005).
 - 4) "The Role of Odd-Electron Intermediates and In-Cage Electron Transfer in Ultrafast Photochemical Disproportionation Reactions in Lewis Bases," M. F. Kling, **J. F. Cahoon**, E. A. Glascoe, J. E. Shanoski, C. B. Harris. J. Am. Chem. Soc. *126*, 11414-11415 (2004).
 - 3) "Polyimide Nanocomposites Prepared with a Novel Aromatic Surfactant," D. M. Delozier, R. A. Orwoll, **J. F. Cahoon**, J. S. Ladislaw, J. G. Smith, J. W. Connell. High Perform. Polym. *15*, 329-346 (2003).
 - 2) "Polyimide Nanocomposites Prepared from High-Temperature, Reduced Charge Organoclays," D. M. Delozier, R. A. Orwoll, **J. F. Cahoon**, J. S. Ladislaw, J. G. Smith, J. W. Connell. Polymer *44*, 2231-2241 (2003).
 - 1) "Preparation and Characterization of Polyimide/Organoclay Nanocomposites," D. M. Delozier, R. A. Orwoll, **J. F. Cahoon**, N. J. Johnston, J. G. Smith, J. W. Connell. Polymer *43*, 813-822 (2002).

Invited Conference Presentations

- 16) "Synthesized Silicon Nanostructures for Optical Switches and GHz-THz Electronics," IEEE 2018 Research and Applications of Photonics In Defense Conference (RAPID), Miramar Beach, FL, August 23, 2018.
- 15) "Design, Synthesis, and Passivation of Metal Oxide Photocathodes for Aqueous Solution," National Meeting of the American Chemical Society, New Orleans, LA, March 20, 2018
- 14) "Designing Geometric Superlattices and Asymmetry in Silicon Nanowires: Encoding Emergent Electronic and Photonic Properties through Morphology," Photonics West, San Francisco, CA, January 30, 2018
- 13) "Designing Symmetric and Asymmetric Morphology in Silicon Nanowires to Encode Advanced Electronic and Photonic Functionality," 232nd Electrochemical Society Meeting, National Harbor, MD, October 2, 2017
- 12) "Designing Sub-10 nm Morphology and Functionality in Silicon Nanowires and Nanowire Networks," IEEE International Conference on Nano/Micro Engineered and Molecular Systems, Los Angeles, CA, April 12, 2017
- 11) "Design, Synthesis, and Passivation of Metal Oxide Photocathodes: Fixing and Moving Beyond NiO," Solar Energy Research Conference (SERC), Chapel Hill, NC, October 20, 2016

- 10) "Architectural Nanomaterials: Designing Semiconductor Morphology so Form Follows Function," IEEE Eastern North Carolina Photonics Chapter Meeting, Research Triangle Park, NC, March 16, 2016
- 9) "Architectural Silicon: Controlling the Composition and Morphology of Nanowires for Advanced Electronic and Photonic Device Functionality," The 9th International Conference on Advanced Materials and Devices (ICAMD), Jeju, South Korea, December 7-9, 2015
- 8) "Architectural Nanomaterials: Designing Semiconductor Morphology so Form Follows Function," Joint symposium of the MRS, ASM, and AVS local chapters, Raleigh, NC, November 13, 2015
- 7) "Designing Solar Photocathode Materials for Solar Fuels", NC Photochemistry Symposium, Charlotte, NC, October 10, 2015
- 6) "Architectural Nanomaterials: Designing Semiconductor Morphology so Form Follows Function," 27th Annual Packard Fellows Meeting, Monterey, CA, September 9-12, 2015
- 5) "Designing Photocathode Materials for Solar Fuels Photoelectrosynthesis: From the Lab to the Classroom," Cottrell Scholars Conference, Tucson, AZ, July 8-10, 2015
- 4) "Architectural Silicon: Controlling the Composition and Morphology of Nanowire Heterostructures on the Few-Nanometer Length Scale," The 9th International Conference on Silicon Epitaxy and Heterostructures, Montreal, Canada, May 18-22, 2015
- 3) "Encoding Dopants and Morphology in Silicon Nanowires: From Fundamentals to Applications," Joint "Nanowires Workshop" and "Nanowire Growth Workshop," Eindhoven, Netherlands, August 25-29, 2014
- 2) "Designing Sub-Wavelength Silicon Nanowires for Photovoltaics: Synthesis, Measurement, and Modeling," Materials Challenges in Alternative & Renewable Energy 2014, February 19, 2014
- 1) "High-Resolution Control of Silicon Nanowire Shape and Composition for Bottom-Up Nanophotonics," Nano Korea, July 11, 2013, Seoul, South Korea

Invited University Presentations, Seminars, and Colloquia

- 21) University of Colorado Boulder, Physical Chemistry Colloquium, March 28, 2017
- 20) University of Chicago, Department of Chemistry, March 24, 2017
- 19) North Carolina Central University, Department of Chemistry, February 10, 2017
- 18) University of Wisconsin Madison, Department of Chemistry, October 10, 2016
- 17) Northwestern University, Department of Chemistry, September 30, 2016
- 16) University of Utah, Department of Chemistry, August 29, 2016
- 15) Cornell University, Department of Chemistry, May 16, 2016
- 14) Johns Hopkins University, Department of Chemistry, March 7, 2016
- 13) University of Texas at Austin, Department of Chemistry, February 25, 2016
- 12) Rice University, Department of Chemistry, February 22, 2016
- 11) Georgia Tech, Department of Chemistry, February 4, 2016
- 10) Emory University, Department of Chemistry, February 3, 2016
- 9) University of Illinois Urbana-Champaign, Department of Chemistry, January 21, 2016
- 8) Carnegie Mellon University, Department of Materials Science and Engineering, February 6, 2015.
- 7) Joint School of Nanoscience and Nanotechnology, University of North Carolina at Greensboro and North Carolina A&T University, October 17, 2014
- 6) University of North Carolina at Charlotte, Department of Chemistry, October 28, 2013
- 5) North Carolina A&T University, Department of Chemistry, September 26, 2013

- 4) Duke University, Department of Chemistry, April 30, 2013
- 3) College of William and Mary, Department of Chemistry, October 19, 2012
- 2) Appalachian State University, Department of Chemistry, October 28, 2011
- 1) North Carolina State University, Department of Physics, October 18, 2011

Patents

- 1) Methods and Systems for Chemically Encoding High-Resolution Shapes in Silicon Nanowires, U.S. Patent Application Serial No. 14/925,530. Filed 10/28/2015.
- 2) Devices, Systems, and Methods for Site-Selective Passivation of Surface Defects via Target Atomic Deposition (TAD), U.S. Provisional Patent Application Serial No. 62/284,913. Filed 10/09/2015.
- 3) Capillarity-Driven Welding of Semiconductor Nanowires for Flexible Three-Dimensional Networks with Ohmic Interconnects, U.S. Provisional Patent Application No. 62357071. Filed 06/30/2016

Grants & Funding

- 10) UNC Energy Frontier Research Center: Alliance for Molecular Photoelectrode Design (AMPED)
Source: Department of Energy, Basic Energy Sciences (Award DE-SC0001011)
Amount: \$1,800,000
Dates: 08/1/2018-07/31/2020
- 9) ROI: Center of Hybrid Materials Enabled Electronic Technology (CH-MEET)
Role: Co-Principal Investigator
Source: NC Research Opportunity Initiative
Amount: \$210,000 over 3 years (to Co-PI Cahoon)
Dates: 07/01/2017-06/30/2020
- 8) CAREER: Developing Advanced Morphological Control of Nanowires to Encode Photonic and Optoelectronic Functionality
Role: Principal Investigator (no Co-PIs)
Source: National Science Foundation, (Award DMR-1555001)
Amount: \$550,000 over 5 years
Dates: 09/01/2016-08/31/2021
- 7) NNCI: North Carolina Research Triangle Nanotechnology Network (RTNN)
Description: A joint proposal between UNC Chapel Hill, North Carolina State University, and Duke University for the National Nanotechnology Coordinated Infrastructure (NNCI) program
Role: Co-Principal Investigator and Site Director for UNC-Chapel Hill
Source: National Science Foundation (Award ECCS-1542015)
Amount: \$5,500,000 over 5 years
Dates: 09/16/2015-09/15/2020
- 6) Sloan Research Fellowship
Source: Alfred P. Sloan Foundation
Amount: \$50,000 over 2 years
Dates: 09/15/2015-09/14/2017
- 5) Cottrell Scholar Award
Designing Photocathode Materials for Solar Fuel Photoelectrosynthesis
Source: Research Corporation for Science Advancement
Amount: \$75,000 over 3 years
Dates: 07/01/2015-06/30/2018
- 4) Packard Fellowship for Science and Engineering

Architectural Nanomaterials: Designing Form to Follow Function

Source: David and Lucile Packard Foundation

Amount: \$875,000 over 5 years

Dates: 11/01/2014-10/31/2019

- 3) UNC Energy Frontier Research Center: Solar Fuels Phase II (EFRC Director: Prof. Thomas J. Meyer)
Role: Senior Personnel
Source: Department of Energy, Basic Energy Sciences (Award DE-SC0001011)
Amount: Sub-award to PI, \$244,048 over 4 years
Dates: 08/1/2014-07/31/2018
- 2) High-resolution morphological control of Si nanowires for bottom-up photonics and plasmonics
Role: Principal Investigator (no Co-PIs)
Source: National Science Foundation (Award DMR-1308695)
Amount: \$450,000 over 3 years
Dates: 09/01/2013-08/31/2016
- 1) UNC Energy Frontier Research Center: Solar Fuels (EFRC Director: Prof. Thomas J. Meyer)
Role: Senior Personnel
Source: Department of Energy, Basic Energy Sciences (Award DE-SC0001011)
Amount: Sub-award to PI, \$116,642 over 2 years
Dates: 08/1/2012-07/31/2014

Teaching Activities

Courses:

- 13) Fall 2018: Chemistry 470: Fundamentals of Materials Science
Number of students: 17 (one section only)
- 12) Spring 2018: Chemistry 482L: Physical Chemistry Laboratory II
Number of students: 5 (Section 1); 7 (Section 2); 9 (Section 3)
- 11) Fall 2017: Chemistry 470: Fundamentals of Materials Science
Number of students: 15 (one section only)
- 10) Spring 2017: Chemistry 482L: Physical Chemistry Laboratory II
Number of students: 10 (Section 1); 8 (Section 2); 10 (Section 3)
- 9) Fall 2016: Chemistry 470: Fundamentals of Materials Science
Number of students: 20 (one section only)
- 8) Fall 2015: Chemistry 470: Fundamentals of Materials Science
Number of students: 26 (one section only)
- 7) Spring 2015: Chemistry 481: Physical Chemistry I
Number of students: 22 (one section only)
- 6) Fall 2014: Chemistry 470: Fundamentals of Materials Science
Number of students: 19 (one section only)
- 5) Spring 2014: Chemistry 482L: Physical Chemistry Laboratory II
Number of students: 2 (Section 1); 3 (Section 2); 9 (Section 3)
- 4) Fall 2013: Chemistry 470: Fundamentals of Materials Science
Number of students: 19 (one section only)
- 3) Spring 2013: Chemistry 482L: Physical Chemistry Laboratory II
Number of students: 7 (Section 1); 7 (Section 2); 12 (Section 3)
- 2) Fall 2012: Chemistry 473: Chemistry and Physics of Surfaces
Number of students: 7 (one section only)
- 1) Fall 2011: Chemistry 470: Fundamentals of Materials Science
Number of students: 13 (one section only)

Current Ph.D. students:

- 1) Teitsworth, Taylor: Fall 2015 – Present
- 2) Taggart, Aaron: Fall 2015 – Present
- 3) Custer, James: Fall 2015 – Present
- 4) Meyers, Jon: Fall 2015 – Present (NSF Graduate Research Fellow)
- 5) Kim, Seokhyoung: Fall 2014 – Present (Kwanjeong Scholar)

Former Ph.D. students:

- 1) Flynn, Cory (Ph.D. May 2016)
- 2) Christesen, Joseph (Ph.D. August 2016)
- 3) Zhang, Xing (Ph.D. May 2017)
- 4) Pinion, Christopher (Ph.D. August 2017)
- 5) Moot, Taylor (Ph.D. December 2017)
- 6) Celano, Thomas (Ph.D. May 2018)
- 7) McCullough, Shannon (Ph.D. August 2018)
- 8) Hill, David (Ph.D. August 2018)

Former post-doctoral fellows supervised:

- 1) Kyoung-Ho Kim (November 2016 – August 2018)

Professional Service to Discipline

Conference organizer:

- 1) Co-organizer, Materials Research Society Fall 2016 National Meeting in Boston, MA
Symposium NM1: "Semiconducting Nanowires, Nanoribbons and Heterostructures—Synthesis, Characterizations and Functional Devices"
- 2) Co-organizer, Solar Energy Research Center (SERC) Fall 2015 Meeting in Chapel Hill, NC
- 3) Co-organizer, Materials Research Society Spring 2014 National Meeting in San Francisco, CA
Symposium F: "Controlling the Interaction between Light and Semiconductor Nanostructures for Energy Applications"

Reviewer:

- 1) Grant Proposals: Reviewer for National Science Foundation and Department of Energy, including on-site reviewing panels for ARPA-E and NSF-DMR Electronic and Photonic Materials Program
- 2) Journal Manuscripts: *Science*, *Science Advances*, *Nature Nanotechnology*, *Nature Communications*, *Nano Letters*, *ACS Nano*, *Advanced Materials*, *Nanotechnology*, *Journal of Physical Chemistry*, *ACS Applied Materials and Interfaces*, *ACS Photonics*, *Physical Chemistry-Chemical Physics*, *RSC Advances*, *Optics Express*, *Applied Physics-A*, *Applied Optics*, *Chemistry of Materials*, *Pure and Applied Chemistry*, *Physica-Status-Solidi*, *Nanoscale*, *Nanoscale Research Letters*, *Journal of Crystal Growth*, *Energies*

Professional Service within UNC-Chapel Hill

Department of Chemistry Committees:

- 1) Spring 2016: Department of Chemistry Strategic Planning Committee
- 2) Fall 2015: Faculty Search Committee for Bio-organic and Polymer Chemistry
- 3) Fall 2013–Current: Graduate Studies Committee
- 4) Fall 2014–Current: Safety Committee
- 5) Fall 2013: Faculty Search Committee for Physical Chemistry
- 6) Fall 2012–Spring 2013: Safety Committee
- 7) Fall 2011–Spring 2013: Graduate Recruitment Committee
- 8) Fall 2012: Faculty Search Committee for Soft Matter

UNC Energy Frontier Research Center (EFRC) Committees:

- 1) Fall 2014–Current: EFRC Section Lead for the “Photocathode”
- 2) Fall 2013: EFRC Renewal Committee Member
- 3) Fall 2013–Summer 2014: EFRC Section Lead for “Interface Structure and Stabilization”
- 4) Spring 2013–Current: EFRC Executive Committee Member

Research Triangle Nanotechnology Network (RTNN) Committees for the National Nanotechnology Coordinated Infrastructure (NNCI) Network:

- 1) Fall 2015–Current: UNC Site Director for the RTNN
- 2) Fall 2015–Current: Executive Committee
- 3) Spring 2014—Summer 2015: Proposal Writing Committee